UNITS EQUIPPED WITH ELECTRONIC CONTROL

IMPORTANT: READ AND SAVE THESE INSTRUCTIONS. INSTALLATION AND WIRING MUST BE IN ACCORDANCE WITH CEC, NEC AND LOCAL ELECTRICAL CODES.

GENERAL

Units incorporating electronic controls are factory-shipped with an active keypad control and display mounted to the control panel. The unit functions are controlled by the user by pressing the keys on the keypad, and reading the display. However, the unit also has the latent ability to be field-converted by qualified service personnel for use with a field-supplied 24 volt AC wall thermostat. These instructions will address both unit-mounted control operation, and remote 24 volt AC wall thermostat operation.

CONTROL AT THE UNIT, KEYPAD/DISPLAY

THE KEYPAD CONTROL

Become familiar with the keypad keys as shown in Figure 1.

Display
Uses red light emitting diodes (LEDs) to display the current temperature of the air entering the unit, and also to display the desired setpoint temperature for room comfort. It is important to remember that the temperature displayed is the temperature sensed at the units indoor air inlet and is hence only related to the bulk room temperature at a distance from the unit.

On/Off Key
Each press of the key toggles the unit from an OFF state to an ON state or from an ON state to an OFF state. Heating and cooling functions, as well as the display and all LEDs except for the fan indicators, are enabled or disabled with this key. When OFF, the control preserves only two modes active; fan-only, and room freeze protection.

Fan Key
Each press of the Fan Key cycles the fan through three modes of operation; Low Speed, High Speed and Auto. Small LEDs will indicate the mode. The On/Off key need not be ON to operate the fan and set fan speeds. Auto Mode will cycle the fan on and off, and set the fan speed, with the heating or cooling demand.

Warmer Key
Pressing the Warmer Key will cause the display to show setpoint temperature for 3 seconds, and then increases room temperature by 1 degree for every further press of the key.

Cooler Key
Pressing the Cooler Key will cause the display to show setpoint temperature for 3 seconds, and then decreases room temperature by 1 degree for every further press of the key.

°F/°C Key
This key toggles the display between Fahrenheit and Celsius temperature modes, and affects all displayed temperatures.

Heat Key
The Heat Key toggles the unit in and out of heating mode for every press of the key, provided the On/Off Key is ON.

Cool Key
The Cool Key toggles the unit in and out of cooling mode for every press of the key, provided the On/Off Key is ON.

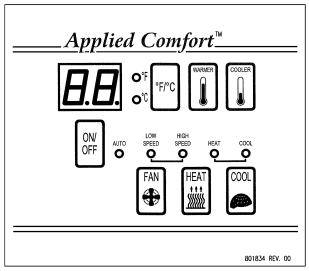


Figure 1

OPERATION USING KEYPAD

When the unit is first plugged in, or when recovering from a power outage, there will be a random 5 to 15 second delay before the electronic control powers up. This minimizes the large electrical surge that would otherwise occur if all units in a building started up at the same time.

To Initiate Heating or Cooling Mode
Press On/Off Key to turn on the LED display and commence full functionality. Push the °F/°C Key to obtain the desired temperature scale. Press the Heat or Cool key as applicable, and the current indoor temperature will be shown on the display.

Set Desired Temperature
Press Cooler, or Warmer key as applicable. Each push of the key increases or decreases the set point temperature by 1 degree, as applicable.

Set Fan Mode
Press Fan key to cycle through the fan settings as indicated by the small circular LEDs. Select continuous High speed fan, continuous Low speed fan, or Intermittent Auto. Auto cycles the fan on and off with the calls for heating or cooling. Auto also sets fan speed according to the amount of heating or cooling demanded. In Auto mode, the fan will start up periodically to establish airflow; air temperature will be sampled, and then the fan will shut off again if there is no demand.

Disable Heating or Cooling, but Initiate Fan-Only
Press On/Off key to turn off LED display. Press Fan key to cycle through the fan settings as indicated by the small circular LEDs. Select continuous High or Low speed. Do not select Auto, as it will turn the fan off.

CONTROL AT THE WALL THERMOSTAT, 24 VAC

CONVERSION TO REMOTE THERMOSTAT

Except for the wall thermostat and thermostat cable, everything is included with the unit to field convert a keypad-operated unit to 24 Volt AC wall thermostat operation, by qualified service personnel. Specific conversion instructions are detailed on the wiring diagram affixed to each particular unit to be converted. Conversion involves accessing the high voltage wiring compartment and changing a switch setting on the electronic board.

WARNING: This procedure involves exposure to high voltage electrical circuits in the control box in order to make the necessary change to the DIP switch, and must be performed by qualified service personnel. Failure to do so could result in property damage, personal injury or death. Disconnect electric power to the unit before servicing.

A factory-supplied 24 Volt wiring harness is provided with every unit to facilitate connection to the wall thermostat wiring. One end has a multi-pin connector that mates with a connector exiting the unit. The other end has preinstalled butt splice connectors, which play a dual role in insulating any unused connectors, and in making wire connections for wires that are used.

The final step is to apply the masking label provided, in order to cover up the keypad. The keypad and display will be disabled and no longer be available for control. The masking label markings instruct the user to go to the wall thermostat for controlling the unit.

THERMOSTATS THAT CAN BE USED

The features of the 24 VAC wall thermostat chosen will dictate the extent of the features available from the unit.

Electric Heat / Cool and Hydronic Units
Electric Heat / Cool and Hydronic Units can accommodate the following thermostats in either manual or automatic changeover:

- Single Stage Heat/Cool, Single Speed Fan
- Single Stage Heat/Cool, Two Speed Fan

Note: The thermostat selection must be verified to ensure its control logic will always energize a Fan output (G) on a call for heat – otherwise known as an “Electric Heat Type Thermostat”.

Heat Pump Units
Heat Pump Units can accommodate these thermostats in either manual or automatic changeover:

- Single Stage Heat/Cool, with additional B terminal to energize reversing valve.
- Two Stage Heat/Cool (no 2nd stage cooling source is available), with additional B terminal to energize reversing valve.
- Single Stage Heat Pump with Emergency Heat
- Two Stage Heat Pump (no 2nd stage cooling source is available) with Emergency Heat

All the above can have single speed or two speed fan control.

Note: For two stage heating applications, the second stage will take priority over the first stage and the stages will never be simultaneously energized.

The wiring diagrams affixed to the units will guide the specific connection strategies for the particular thermostats used.

THERMOSTAT LOCATION:

Proper functioning of the thermostat depends on accurate room temperature sensing. Be conscious of locating the thermostat where temperatures near the thermostat are not representative of room temperature.

For example, do not install the thermostat where it is subjected to direct sunlight, other sources of heat, or cold drafts, including air discharged from a supply air register. A common error is not sealing the hole in the wall where the thermostat cable passes through directly behind the thermostat body. Air from behind the wall can drastically affect the temperature sensed by the thermostat.

Applied Comfort

THERMOSTAT OPERATION

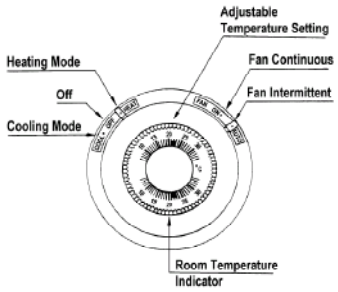
When the unit is first plugged in, or when recovering from a power outage, there will be a random 5 to 15 second delay before the electronic control powers up, as in the case of the Keypad control. The keypad is totally disabled once the DIP switch has been set for remote mode.

The unit will obey the commands from the thermostat.
The thermostat will automatically maintain the temperature in the room, based on the setting pre-set by the user. If the thermostat has only single fan speed capability, a decision will need to be made as to whether the fan will always run in high speed or low speed, and then the appropriate fan speed wiring connection can be made at the unit.

All the internal control features of the electronic board remain active, except for keyboard and display interface functions and room temperature sampling. Room temperature is detected at the location of the wall thermostat, and is usually an accurate representation of room temperature.

The thermostat used may have advanced features beyond the basic functions described below. Consult your thermostat Installation and Operating Instructions for further information.

In addition to controlling room temperature, the room thermostat is also used to select whether the unit is to be in heating mode, or cooling mode, or in automatic changeover between the modes. It also determines whether the system is to be ON or OFF, and whether the fan is to run continuously, or to cycle with heating or cooling demand.



Once a comfortable temperature setting is established, no other adjustments are necessary, except for fan speed, which may or may not be adjustable on your particular thermostat.

WALL THERMOSTAT OPERATION	
Heat	Sets the unit into heating mode. Initiates heating when room temperature falls below set point.
Off	Disables heating and cooling modes, but allows control of fan.
Cool	Sets the unit into cooling mode. Initiates cooling when room temperature rises above set point.
Auto (not shown)	Found on automatic changeover thermostats only. Allows the thermostat to decide whether it should be in the heating or cooling mode. Usually a 4 F° differential or "deadband" will exist between heating and cooling set points to prevent inadvertent rapid switching between modes.
Temperature Setting	Establishes the "set point", or desired room temperature.
Fan On	Synonymous with "Fan Continuous". Fan will continue to run after the heating and cooling function has cycled off. Fan will continue to run even when mode switch is in Off position.
Fan Auto	Synonymous with "Fan Intermittent". Fan will cycle on and off with the heating cycle or cooling cycle, and will not operate between cycles.

ADDITIONAL FEATURES:

Some additional features of the Electronic Control units are as follows:

Room Freeze Protection
This feature is enabled when the unit is shipped from the factory. The feature can be disabled by qualified service personnel. If power is available to the unit, and regardless of whether it is turned ON or OFF, the unit will automatically supply heat to the room with the fan running at low fan speed if the room temperature falls to 55°F. The heat will turn off when the room temperature reaches 60°F. For the feature to work, the unit must be configured with a heat source, whether it be electric heater, heat pump with electric heat, or hydronic (hot water would need to be standing by). The feature is enabled whether the unit is configured for keypad or remote thermostat.

Compressor Short-Cycle Protection
If the electronic control shuts the compressor down for any reason, a 3 minute time delay will elapse before the compressor is allowed to re-start. This prevents compressor overload during re-start due to unequal system refrigerant pressures.

Emergency Heat Switch (Heat Pumps Only)
If the compressor fails to operate, and there is a heating demand, all heat pump units will have a rocker switch that can activate a dedicated electric heat mode until a repair can be made. The front cover must be removed to access the switch.

Indoor Coil Freeze Protection
Control of frost on the evaporator coil due to low indoor loads, or cold outdoor ambient temperatures, is provided. The protection remains active when the unit is OFF, for either keypad or remote thermostat application, as long as the unit is plugged in, power is available, and a heat source is configured in the unit and is working.

Low Outdoor Temperature Lock-out
If the outdoor temperature is too low for proper compressor operation, cooling operation will be suspended. Similarly, heat pump heating operation will cease and the unit will automatically switch over to electric heating mode until the outdoor temperature rises to an acceptable point, depending upon the application.

Indoor Temperature Limiting
Using the keypad control and display, high and low temperature limits can be established to prevent the user from entering set point temperatures colder or warmer than what the property manager or hotel operator may desire. The temperature limit choices are as follows:

Configuration Code	Low Limit (°F)	High Limit (°F)
R1	63	86
R2	65	86
R3	65	90
R4	67	88
R5	67	92
R6	69	90
R7	69	72

The procedure to set the limits is as follows:

Depress the On/Off key, the °F/°C key, and the Warmer key simultaneously for 5 seconds to enter the limit setup mode. The Warmer and Cooler keys will scroll through the R-values indicated in the above table. Once the desired R-value has been obtained on the display, press the On/Off key to accept the change, and then press it again to effect the change and restore the normal display.

TROUBLESHOOTING GUIDE - ELECTRONIC CONTROL UNITS, COOLING-ONLY, HEAT/COOL, HEAT PUMP

SYMPTOM	CAUSE	CHECK / CORRECTION
No Cooling	System switch set to OFF or HEAT on wall thermostat (remote thermostat units only)	Switch to COOLING or AUTO
	System set to OFF at Keypad	Press On/Off key to turn unit ON, then press the COOL Key.
	System set to HEAT at Keypad	Press the COOL Key.
	Faulty thermostat (remote thermostat units only).	Test and replace if necessary.
	Fuse or circuit breaker tripped.	Replace or reset as necessary.
	Cord not plugged in.	Plug in.
	LCDI cord plug head safety circuit tripped	Press reset button on back or side of LCDI plug, as applicable, to restore power to the unit. If LCDI trips again and will not stay reset, contact qualified service personnel.
	Defective keypad, display, or main board.	Contact qualified service personnel.
	DIP switch improperly set on electronic board.	Contact qualified service personnel. Review specific wiring diagram.
	Indoor room temperature is below set point.	If comfort is not yet achieved, lower the thermostat setting (if using a remote thermostat), or depress the COOLER key on the keypad (in non-remote), as applicable.
	Outdoor temperature too low	Unit is outside range of operation. Outdoor temperature must warm up before cooling operation can resume.
No Heating	System switch set OFF on wall thermostat (remote thermostat units only)	Switch to HEATING or AUTO
	System set to OFF at Keypad	Press On/Off key to turn unit ON, then press the HEAT Key.
	Faulty thermostat (remote thermostat units only)	Test and replace if necessary.
	Fuse or circuit breaker tripped	Replace or reset as necessary.

	Cord not plugged in	Plug in.
	LCDI cord plug head safety circuit tripped	Press reset button on back or side of LCDI plug, as applicable, to restore power to the unit. If LCDI trips again and will not stay reset, contact qualified service personnel.
	Defective keypad, display, or main board	Contact qualified service personnel.
	Indoor room temperature is above set point	If comfort is not yet achieved, raise the thermostat setting (if using a remote thermostat), or depress the WARMER key on the keypad (for non-remote), as applicable.
	Defective heater	Contact qualified service personnel.
	DIP switch improperly set on electronic board	Contact qualified service personnel. Review specific wiring diagram.
	One-shot thermal fuse is blown	Contact qualified service personnel.
	Automatic reset high limit control will not reset	Contact qualified service personnel.
	Applicable Aquatstat low voltage wires not jumpered, as required, if no aquastat is used (hydronic units only)	Review specific wiring diagram.
	Defective aquastat (hydronic units only)	Replace as required.
	No hot water supply (hydronic units only)	Contact qualified service personnel.
	DIP switch improperly set on electronic board (hydronic units only)	Contact qualified service personnel. Review specific wiring diagram for addressing “Normally Open” vs. “Normaly Closed” Hydronic Valves.
	Broken, shorted, loose, or incorrect wiring	Contact qualified service personnel.
	Compressor is defective (heat pump only)	Remove front cover and locate the emergency heat switch. Switch to EMERGENCY HEAT as directed by the label located adjacent to the switch – this will activate the electric heater if there is a heating demand. Contact qualified service personnel to deal with the compressor repair.
	Compressor is defective (heat pump only, remote thermostat only)	The wall thermostat may have an EMERGENCY HEAT setting. Select this switch setting - this will activate the electric heater if there is a heating demand. Contact qualified service personnel to deal with the compressor repair.
No Fan Operation	System switch set to OFF on wall thermostat (remote thermostat units only)	Switch to LOW FAN, HIGH FAN, or FAN ON, as applicable.
	With system set to OFF on keypad, Fan is set to AUTO at Keypad	Press FAN key to cycle through FAN LOW, FAN HIGH, and AUTO. Select the fan setting as desired. FAN AUTO will keep the fan off if the ON/OFF key is set to OFF.
	Defective fan motor	Contact qualified service personnel.
	Faulty thermostat (remote thermostat units only)	Test and replace if necessary.
	Fuse or circuit breaker tripped	Replace or reset as necessary.
	Cord not plugged in	Plug in.
	LCDI cord plug head safety circuit tripped	Press reset button on back or side of LCDI plug, as applicable, to restore power to the unit. If LCDI trips again and will not stay reset, contact qualified service personnel.
	Defective keypad, display, or main board	Contact qualified service personnel.
Remote Thermostat does not Properly Control Room Temperature, Causes Unit to Run Continuously, or Causes Abnormal Cycle Times	Unwanted source of heating or cooling is near the wall thermostat causing the thermostat to sense a temperature other than room temperature (remote thermostat units only)	Eliminate the unwanted heating or cooling source or move the wall thermostat. See if thermostat is too close to a supply air register. Seal the hole in the wall where the thermostat cable passes into the thermostat.
	Wall thermostat body may be heating up due to impingement of direct sunlight, at a certain time of day	Relocate thermostat, provide shade for the thermostat, or just live with the problem if it occurs for only a short time during the day.
	Defective thermostat	Test and replace if necessary.
	DIP switch improperly set on electronic board	Contact qualified service personnel. Review specific wiring diagram.
Keypad controls do not Properly Control Room Temperature, Causes Unit to Run Continuously, or Causes Abnormal Cycle Times in Heating or Cooling Mode	Air seals in wall sleeve are worn out, or completely missing. This allows outdoor air to be blended with indoor return air and the indoor temperature probe detects the erroneous blended temperature.	Take whatever steps are necessary to correct chassis-to-sleeve leakage. Contact qualified service personnel.
	Defective keypad, display, or main board	Contact qualified service personnel.
Compressor Short-Cycles	Restricted outdoor coil	Check for dirt or other outdoor coil restriction. Clean as necessary.
	Recycling of outdoor air	Check for inadequate outdoor air installation clearances. Outdoor coil may not be sealed against outdoor grille causing hot discharge air to be recirculated back into the condenser air intake. Contact qualified service personnel to correct condition.
	Recycling or blockage of indoor air causing frosting of indoor coil. Frosting of indoor coil can cause compressor short-cycling.	Ensure that curtains or other obstructions are not blocking the indoor air inlet, indoor air outlet, or creating a pocket to short-circuiting indoor air from the outlet grille to the return air intake.
	Dirty air filter	Clean or replace
	Dirty evaporator coil	Clean as necessary.
	Fan motor(s) operating intermittently, rotating slowly, or not at all	Contact qualified service personnel.
	Faulty thermostat (remote thermostat units only)	Test and replace if necessary.
	Indoor coil freezing	See “Indoor Coil Frosts”
	Indoor room temperature too cold	Compressor will cycle on and off at the command of indoor coil frost control thermostat.
	Outdoor temperature too cold	Compressor is not intended to operate at cold outdoor temperatures. Compressor operation will be locked out until the outdoor temperature rises, or compressor will cycle on and off at the command of the frost control devices.
	Defective keypad, display, or main board	Contact qualified service personnel.
Unit Trips Fuse or Circuit Breaker	Shorted or incorrect wiring	Contact qualified service personnel.
	Fuse or breaker setting too low	Check nameplate fuse size.
	Low voltage	Check voltage with unit running and ensure it is within nameplate limits.
	Seized, noisy, or slow running compressor	Contact qualified service personnel.
	Defective keypad, display, or main board	Contact qualified service personnel.
Indoor Coil Frosts	Dirty air filter	Clean or replace.
	Dirty indoor coil	Clean as necessary.
	Blower motor operating intermittently, rotating slowly, or not at all	Contact qualified service personnel.
	Recycling or blockage of indoor air causing frosting of indoor coil. Frosting of indoor coil can cause compressor short-cycling.	Ensure that curtains or other obstructions are not blocking the indoor air inlet, indoor air outlet, or creating a pocket to short-circuiting indoor air from the outlet grille to the return air intake.
	Defective suction line thermostat	Contact qualified service personnel.
	Low refrigerant charge	Look for telltale signs of low charge. During cooling operation, check frosting pattern starting from defrosted condition. If the whole indoor coil face frosts uniformly at the same time, it indicates that the unit has insufficient indoor airflow. If frost works its way up the face of the evaporator during operation over time, it indicates low charge. Contact qualified service personnel.
Heater Output Intermittent or Insufficient	Faulty thermostat	Test and replace if necessary.
	Automatic reset high limit control defective	Replace high limit.
	Dirty air filter	Clean or replace
	Dirty evaporator coil	Clean as necessary.
	Defective main board	Contact qualified service personnel.
	Blower motor operating intermittently, rotating slowly, or not at all	Check if blower wheel or shaft is being rubbed or experiencing external friction. Check free rotation of the motor shaft. Check voltage to motor. Check motor capacitor. Check for miswiring. Replace motor, if necessary.
Water Drips from Unit	Sleeve not properly mounted	Check sleeve for the required .64 cm (¼") per foot pitch down from indoor to outdoor side and level side-to-side. Readjust as required.
	Condensate drain plugged	Clean condensate drain.
	Evaporator drain pan leaky	Inspect, repair or replace drain pan as required.
	Unusually high moisture content in the indoor and/or outdoor air	Under certain indoor and outdoor conditions, excessive condensate is generated beyond the rate at which the unit can reject to the outdoor air stream by evaporation.
	Drain holes plugged in bottom edge of sleeve on outdoor side	Inspect and clear blockage.